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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 689,297	10 11 2000	Hitoshi Kihara	SHX 314	1159

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EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

6

DATE MAILED: 05/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/689,297

Applicant(s)

KIHARA ET AL.

Examiner

Jennifer A. Leung

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 12-36 is/are pending in the application.
- 4a) Of the above claim(s) 18 and 25-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 12-17, 19-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) 12-36 are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other:

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 18, 25-36 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.
2. Applicant's election of claims 12-17 and 19-24, including linking claims 12 and 19, in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### *Priority*

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Drawings*

4. Figures 18 and 19 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).
5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "24" in FIG. 1 has been used to designate both "conduit [for column bottoms liquid]" (page 14, line 8) and "conduit [for part of reboiler output vapor]" (page 14, line 15).

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings.

### *Specification*

6. The disclosure is objected to because of the following informalities. Appropriate correction is required.
  - a. Page 2, line 8: "months" should be changed to --month-- for proper subject verb agreement.
  - b. Page 3, lines 5-7: it is unclear as to what the applicant is attempting to disclose as the lines are written. Also, "or" (line 7) should be changed to --of--.
  - c. Page 6, lines 17-24: it is unclear as to what the applicant is attempting to disclose as the lines are written.
  - d. Page 8, lines 22-23: --prior art-- identification should be added to the description of Figure 18. Likewise for Figure 19 (lines 24-25).
  - e. Page 9, line 3: "cascaded" should be changed to --cascade--.
  - f. Page 10, line 12: --(the inlet of the first conduit 7a)—should inserted before "of the condenser" for consistency (note line 16).
  - g. Page 11, line 4: "suitable" should be changed to -- suitably --.

- h. Page 11, line 24: -- of -- should be inserted after "plurality".
- i. Page 14, line 9: "first return conduit 14" should be changed to --second return conduit 14--. Likewise on page 20, line 17. (note page 10, line 20)
- j. Page 15, line 6: Insert --or condensed second column feed vapor-- before "104". (note page 14, lines 16-17).
- k. Page 21, line 10: "relative" should be changed to --relatively--.
- l. Page 25, line 24: "3" should be changed to --38'-- for consistency with the drawings.
- m. Page 31, line 4: "compound" should be changed to --compounds--.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### *Claim Objections*

7. Claims 12 and 19 are objected to because of the following informalities:

The phrase "liquid mixtures" (line 1) should be changed to --liquid mixture-- for proper subject-verb agreement. Furthermore, "the bottom" (line 4) should be changed to --a bottom-- for proper positive antecedent basis. Likewise, "the top" (line 5) should be changed to --a top--, "the middle section" (lines 7) should be changed to --a middle section--, and "the middle" (line 10) should be changed to --a middle--. Appropriate correction is required.

#### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

Art Unit: 1764

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 12-17 and 19-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In Claim 12, it is unclear as to what structural limitation the applicants are attempting to recite by "An apparatus for separation of a vapor of liquid mixtures comprising" (line 1) and "constructed in a cascade comprising:", and where the body of the claim begins. Likewise in claim 19. Note that the distillation columns, condensers and reboilers are not considered claimed elements of the invention, as written.

Furthermore, it is unclear as to what is intended by "in the vicinity" and where it is disclosed in the specification and drawings. Also, the phrase "in the vicinity" (lines 5, 6, 9) is vague and indefinite. Likewise in claim 19.

Furthermore, it is unclear as to what the applicant is attempting to recite by "the middle section of the  $(k+1)^{\text{th}}$  column" (line 7) and where it is shown in the specification and drawings. Also, "the middle section" is vague and indefinite, and further lacks positive antecedent basis. Likewise in claim 19.

Furthermore, it is unclear as to what the applicant is attempting to recite by "the middle of the  $k^{\text{th}}$  column" (line 10) where it is shown in the specification and drawings. Furthermore, "the middle" lack positive antecedent basis. Likewise in claim 19.

Furthermore, it is unclear as to the definition of "n".

In Claim 13, "type" (lines 2 and 3) is vague and indefinite. Furthermore, "the distillation columns" lacks positive antecedent basis. Likewise in claim 20.

In Claim 14, it is unclear as to the structural relationship between "stage" and the apparatus, and where it is disclosed in the specification and drawings. Likewise in claims 16, 17, 21, 23, and 24.

Furthermore, it is unclear as to the structural relationship between the "hydrogenation device" and the apparatus and means of connection to the apparatus as claimed. Likewise in claims 16, 17, 21, 23, and 24.

In claim 15, it is unclear as to the structural relationship between the "at least one section" (lines 3 and 5) and the apparatus, and where it is disclosed in the specification and drawings. Likewise in claim 22.

In claim 19, it is unclear as to what structural limitation the applicants are attempting to recite by "via a blower".

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Atkinson et al. (US 4,759,786).

With respect to claim 12, Atkinson discloses an apparatus comprising substantially the same components of the instant claims. Atkinson teaches an apparatus for separation of a vapor or liquid mixture (Figure 3) with a plurality of distillation columns (a first column **8** to an nth column **20**) constructed in cascade comprising:

Introduction conduits (conduit from **8** to **20**) which connect the bottom of a  $k^{\text{th}}$  column **8** or an outlet of a reboiler **44** provided in the vicinity of the bottom (FIG. 5) of the  $k^{\text{th}}$  column **8** to the top of a  $(k+1)^{\text{th}}$  column, an inlet of a condenser provided in the vicinity of the top of the  $(k+1)^{\text{th}}$  column, or the middle section of the  $(k+1)^{\text{th}}$  column (FIG. 5); and return conduits **34**, **4**, **6** which connect an outlet of the condenser **26** of the  $(k+1)^{\text{th}}$  column **20** to an inlet of the reboiler **44** provided in the vicinity of the bottom of the  $k^{\text{th}}$  column, the bottom of the  $k^{\text{th}}$  column, or the middle of the  $k^{\text{th}}$  column (FIG. 5).

With respect to claim 13, Atkinson teaches that the columns may be provided with a packing in order to facilitate liquid/vapor contact (column 4, lines 55-57 and column 5, lines 26-30).

Instant claims 12 and 13 read on the system of Atkinson.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.



Art Unit: 1764

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 12-17 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (U.S. 4,173,620) in view of Atkinson et al (U.S. 4,759,786).

With respect to claim 12-14, 16, 17, 21, 23 and 24, Shimizu teaches a system for enriching tritium in heavy water comprising a thermal diffusion column cascade **4**, a hydrogenation device at a stage after the nth column, and an isotope scrambler that connects to at least one section of the apparatus via extraction and return conduits. The hydrogenation device comprises an oxygen feed line **14**, a hydrogen (deuterium) feed line **13**, a combustion chamber **5**, and a heavy water outlet **15**. The isotope scrambler comprises a catalytic column **2**, an electrolysis tank **3**, and purifier for separation of oxygen and hydrogen **3a**, connected by extraction conduit **12** and return conduit **10** to the thermal diffusion column cascade **4**. Shimizu is silent as to whether the thermal diffusion column cascade may be a distillation column cascade. However, Shimizu discloses prior art use of distillation columns for enriching hydrogen (column 1, line 17) in place of the thermal diffusion column cascade.

Furthermore, Atkinson teaches an apparatus for separation of a vapor or liquid mixture (Figure 3) with a plurality of distillation columns (a first column **8** to an nth column **20**) constructed in cascade.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the thermal diffusion column cascade of Shimizu as taught by Atkinson

Art Unit: 1764

because the use of distillation columns is a method of enriching heavy water disclosed in prior art set forth on column 1, line 17 of Shimizu.

With respect to claim 19, Atkinson further teaches a pump **14** for circulation of fluid flow in an introduction conduit of the apparatus. The pump of Atkinson and the instant blower serve a similar purpose of circulation of fluid within a system. Therefore, it would have been obvious to provide a pump or blower into the system, depending on the location requiring circulation, because addition of auxiliary equipment for fluid circulation is easily done by those skilled in the art— for example, by incorporating pumps for liquid flows and blowers for vapor flows. Furthermore, regarding the conduit location of the pump or blower installation, it has been held that rearrangement of parts involves only ordinary skill in the art. *In re Japikse*, 86 USPQ 70 (CCPA 1950).

With respect to claim 20, Atkinson teaches that the columns may be provided with packing in order to facilitate liquid/vapor contact (column 4, lines 55-57 and column 5, lines 26-30).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 12-17 and 19-24 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 25-27, 30 and 31 of U.S. Patent No. 6,321,565 B1 of Kihara et al. in view of Shimizu et al. (U.S. 4,173,620).

Instant claims 12 and 19 are rejected over claims 25, 26, 30, and 31 of US '565 since both claim an apparatus comprising a plurality of distillation columns where the bottom (or lower part of the column) and tops of the columns are connected in cascade arrangement, wherein the bottom may be provided with a reboiler and the top with a condenser.

Instant claims 13 and 20 are rejected over claims 26 and 27 of the US '565 since both claim at least one distillation column with structured packing.

In claims 14, 16, 17, 21, 23 and 24, the same comments with respect to Shimizu apply. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the thermal diffusion column cascade of Shimizu for the distillation columns constructed in cascade of U.S. '565 in order to obtain a hydrogenation device

In claims 15 and 22, the same comments with respect to Shimizu apply. Therefore, it would have been obvious to one of ordinary skill in the art the time the invention was made to substitute the thermal diffusion column cascade of Shimizu for the distillation columns constructed in cascade of US '565 in order to obtain an isotope scrambler.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references are cited for showing the state of the art: Agrawal et al. (U.S. 5,953,936) and Sweet et al. (U.S. 4,559,070) teach systems comprising a plurality of columns

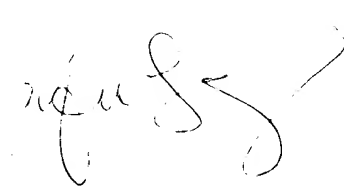
Art Unit: 1764

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian C. Knode can be reached on 703-308-4311. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

JAL  
May 6, 2002



Hien Tran

**HIEN TRAN**  
**PRIMARY EXAMINER**